MATH 30 - Precalculus, Version B

Second Midterm. Time allowed: 2 hours, 15 minutes. Professor Luis Fernández

NAME: ────────

Instructions:

- Write all your answers in the space provided, or attach sheets if you need more space.
- **SHOW ALL YOUR WORK**. Solutions without work shown will receive no credit.
- Non-graphing calculators are allowed. No notes or books allowed.
- The exam has 8 exercises. The points of each exercise are written on the left.
- The exam has a total of 110 points, with 10 extra credit points.

---

[18] **1.** Write the **exact value (NO decimals)** of

a) $\log_4 64 =$

b) $\log_6 \sqrt[3]{6} =$

c) $\log_{123} 123^7 =$

d) $2013^{\log_{2013} 6} =$

e) $\log_9 \dfrac{1}{27} =$

f) $\log_{16} 8 =$

---

[6] **2.** Convert the following from exponential form to logarithmic form.

a) $e^x = 2$

b) $10^{x-2} = 7$

---

[6] **3.** Convert the following from logarithmic form to exponential form.

a) $\operatorname{Ln} y = 3$

b) $\log_3(y + 6) = x + 4$

1

[8] **4.** Condense the following logarithmic expressions (that is, write them using only one logarithm in the front).

    a) $5 \log x + 2 \log y$

    b) $7 \log a + 2 \log b - 7 \log c$

    c) $\frac{1}{5} \left(2 \log x - \frac{1}{2} \log y + \frac{2}{3} \log z \right)$

    d) $\frac{\log x}{5} - \frac{4}{7} \log y$

---

[8] **5.** Expand the following logarithmic expressions (that is, write them using addition and subtraction of logarithms).

    a) $\log_5 (4yz)$

    b) $\log_7 \left(x^2 y^4 \right)$

    c) $\log_9 \left(\frac{x^{14}}{4} \right)$

    d) $\log \left(x^4 y^3 \right)^5$

---

[4] **6.** Write the following logarithms in the indicated base.

    a) $\log_5 7$, in base 6.

    b) $\log_2 9$, in base 10.

[40] **7.** Solve the following equations. If the answer is not an exact numbers, leave it expressed as a logarithm.

a) $7^{x-2} = 49$

b) $4^{x-3} = 8^{2x+1}$

c) $\log_2(x) - 4 = \log_2 3$

d) $\log_3(x-4) + \log_3(x-2) = \log_3(2x-7)$

[20] **8.** For the rational function $f(x) = \dfrac{x^2 + 2x - 3}{x^2 - 2x - 3}$,

a) Factor numerator and denominator and simplify if possible.

b) Find the x intercepts of the graph of $y = f(x)$, if they exist.

c) Find the y intercepts of the graph of $y = f(x)$, if they exist.

d) Find any vertical asymptotes.

e) Find any horizontal asymptotes.

f) Use the information above to sketch a graph of $y = f(x)$.

4